

CLAIMS

1. A transparent light guide plate, comprising:
a rectangular light exit surface;

5 a thick portion positioned at substantially a central portion of said rectangular light exit surface in parallel with opposing two sides of said rectangular light exit surface;

10 thin edge portions formed in parallel on both sides of said thick portion;

a parallel groove which accommodates a bar-like light source and is formed at substantially a center of said thick portion in parallel with said opposing two sides; and

15 inclined rear portions which are symmetrical with respect to a plane including a central axis of said bar-like light source and perpendicular to said rectangular light exit surface, and whose thickness is reduced from said thick portion toward said thin edge portions in a direction perpendicular to said opposing two sides to thereby form
20 inclined rear surfaces on both sides of said parallel groove,

wherein an end portion of said parallel groove is narrowed toward said rectangular light exit surface symmetrically with respect to a center line of said parallel groove perpendicular to said rectangular light exit surface
25 in a sectional shape of said parallel groove in said direction perpendicular to said rectangular light exit surface, in accordance with a ratio of a peak value of illuminance or luminance of emitted light from said bar-like light source accommodated in said parallel groove at a first
30 portion of said rectangular light exit surface corresponding to said parallel groove to an average value of said illuminance or luminance of said emitted light at second

portions corresponding to said inclined rear portions.

2. The light guide plate according to claim 1, wherein
said end portion of said parallel groove is symmetrically
5 narrowed such that a peak value of relative illuminance or
relative luminance at said first portion of said rectangular
light exit surface is three or less times as large as an
average value of said relative illuminance or relative
luminance at said second portions of said rectangular light
10 exit surface.

3. A transparent light guide plate, comprising:
a rectangular light exit surface;
a thick portion positioned at substantially a central
15 portion of said rectangular light exit surface in parallel
with opposing two sides of said rectangular light exit
surface;

thin edge portions formed in parallel on both sides of
said thick portion;

20 a parallel groove which accommodates a bar-like light
source and is formed at substantially a center of said thick
portion in parallel with said opposing two sides; and

inclined rear portions which are symmetrical with
respect to a plane including a central axis of said bar-like
25 light source and perpendicular to said rectangular light exit
surface, and whose thickness is reduced from said thick
portion toward said thin edge portions in a direction
perpendicular to said opposing two sides to thereby form
inclined rear surfaces on both sides of said parallel groove,

30 wherein an end portion of said parallel groove is
narrowed toward said rectangular light exit surface
symmetrically with respect to a center line of said parallel

groove perpendicular to said rectangular light exit surface in a sectional shape of said parallel groove in said direction perpendicular to said rectangular light exit surface, in such a manner that a peak value of illuminance or luminance of emitted light from said bar-like light source accommodated in said parallel groove at a first portion of said rectangular light exit surface corresponding to said parallel groove is three or less times as large as an average value of said illuminance or luminance of said emitted light at a second portion corresponding to said inclined rear portions.

4. The light guide plate according to claim 2 or 3, wherein the peak of relative illuminance or relative luminance at said first portion of said rectangular light exit surface is twice or less as large as said average value of said relative illuminance or relative luminance at said second portion of said rectangular light exit surface.

5. The light guide plate according to any one of claims 1 to 4, wherein said end portion forms an angle of 90 degrees or less, said angle being obtained by combining two angles between both sides of said sectional shape of said parallel groove and a perpendicular line extending from a center of said bar-like light source toward said rectangular light exit surface.

6. The light guide plate according to any one of claims 1 to 5, wherein said end portion forms an angle of 60 degrees or less, said angle being obtained by combining two angles between both sides of said sectional shape of said parallel groove and a perpendicular line extending from a center of

said bar-like light source toward said rectangular light exit surface.

7. The light guide plate according to any one of claims
5 1 to 6, wherein said sectional shape of at least said end
portion of said parallel groove is defined by part of two
straight or curved lines symmetrical with respect to said
center line of said parallel groove, which cross each other
at an intersection as a peak.

10 8. The light guide plate according to claim 7, wherein
said two curved lines defining said sectional shape of at
least said end portion of said parallel groove are convex or
concave with respect to said center line of said parallel
15 groove.

9. The light guide plate according to claim 7 or 8,
wherein said two curved lines defining said sectional shape
of at least said end portion of said parallel groove can be
20 approximated by a tenth-order mathematical function and are
convex or concave with respect to said center line of said
parallel groove.

10. The light guide plate according to claim 7 or 8,
25 wherein said two curved lines defining said sectional shape
of at least said end portion of said parallel groove or said
sectional shape of said parallel groove comprise part of
circular, elliptical, parabolic, or hyperbolic lines, which
are convex or concave with respect to said center line of
30 said parallel groove.

11. The light guide plate according to any one of claims

1 to 7, wherein said sectional shape of at least said end portion of said parallel groove or said sectional shape of said parallel groove is triangular.

5 12. The light guide plate according to any one of claims 7 to 11, wherein said sectional shape at a top of said end portion of said parallel groove is defined by said two straight or curved lines symmetrical with respect to said center line cross each other and a straight or curved line
10 symmetrical with respect to said center line which is connected to said two straight or curved lines before said two straight or curved lines cross each other.

15 13. The light guide plate according to claim 12, wherein said sectional shape at said top of said end portion of said parallel groove has a portion parallel with said rectangular light exit surface where said intersection as the peak is chamfered.

20 14. The light guide plate according to claim 12 or 13, wherein said sectional shape of at least said end portion of said parallel groove or said sectional shape of said parallel groove is triangular, and said sectional shape at said top of said end portion of said parallel groove is a trapezoidal
25 shape symmetrical with respect to said center line.

30 15. The light guide plate according to claim 12, wherein said sectional shape at said top of said end portion of said parallel groove is a curved shape symmetrical with respect to said center line and convex or concave with respect to said rectangular light exit surface.

16. The light guide plate according to claim 12 or 15,
wherein said sectional shape at said top of said end portion
of said parallel groove is a circular, elliptical, parabolic,
or hyperbolic shape obtained by rounding said intersection as
the peak symmetrically with respect to said center line.

17. The light guide plate according to any one of claims
1 to 6, wherein said sectional shape of at least said end
portion of said parallel groove is defined by part of a
elliptical or hyperbolic line.

18. The light guide plate according to any one of claims
1 to 17, wherein said top of said end portion of said
parallel groove is sanded.

19. The light guide plate according to any one of claims
1 to 17, wherein a halftone dot pattern is formed in a
portion of said rectangular light exit surface corresponding
to said top of said end portion of said parallel groove.

20. A light guide plate formed from two or more light
guide plates according to any one of claims 1 to 19, which
are connected with each other at said thin edge portions
thereof.

21. A planar lighting device comprising:
a light guide plate according to any one of claims 1 to
20;

a bar-like light source accommodated in said parallel
groove of said light guide plate;

a reflector provided behind said bar-like light source
to cover said parallel groove;

a reflective sheet provided on said inclined rear surfaces of said inclined rear portions on both sides of said thick portion of said light guide plate; and

5 a diffusion sheet arranged on said rectangular light exit surface of said light guide plate.

22. The planar lighting device according to claim 21, further comprising a prism sheet arranged between said rectangular light exit surface of said light guide plate and
10 said diffusion sheet.

23. The planar lighting device according to claim 21 or 22, wherein a ratio of a peak value of relative illuminance or luminance at a first portion of said rectangular light
15 exit surface of said light guide plate to an average value of relative illuminance or luminance at a second portion of said rectangular light exit surface is determined in accordance with a permissible gap between said rectangular light exit surface of said light guide plate and said diffusion sheet,
20 or a permissible thickness of said planar lighting device.

24. A liquid crystal display device, comprising:

a backlight unit including a planar lighting device according to any one of claims 21 to 23;

25 a liquid crystal display panel arranged on a light exit surface side of said backlight unit; and

a drive unit driving said backlight unit and said liquid crystal display panel.